

# Status of the Human Exploration & Operations Mission Directorate



Mr. William H. Gerstenmaier | March 6, 2012



- **2012 HEO Goals**
- **International Space Station**
- **Launch Services Program**
- **Exploration Systems Development Division**
- **Commercial Space Transportation**
- **Space Life and Physical Sciences Research and Applications**
- **Advanced Exploration Systems**
- **Space Communication and Navigation**
- **Human Spaceflight Capabilities**
- **Strategic Analysis and Integration**
- **Mission Support Services**

# 2012 HEOMD Goals (Refer to Handout)



## Human Exploration & Operations



### 2012 Directorate Goals

- Utilize ISS such that ISS shows the economic benefit of space-based research to commercial and private companies
- Increase public awareness of the marvels associated with ISS, including world-class research/technology advancements and tangible daily benefits to humanity
- Use the ISS international partnerships and the international space exploration coordination group to develop a global vision for human exploration
- Establish viable commercial cargo transportation for ISS
- Utilize ISS for: basic research; proving new insights into problems affecting people on the Earth; and understanding and developing the systems and protocols necessary for humans to venture beyond low Earth orbit for extended durations.
- Articulate meaningful, exciting and viable missions and uses for SLS and Orion MPCV as part of a capability-driven approach to multi-destination human spaceflight exploration
- Engage the public and congress in understanding the reasons for exploration in a way that is exciting to young people
  - Explain the challenges and risks associated with operating at the frontier of research and technology
  - Show the potential benefits of the risks inherent in operating at the frontier
  - Articulate this in a manner that some folks can understand why we explore despite the challenges
- Grow the effectiveness of the directorate and make it a place where people want to work by continuing to technically develop, challenge, and inspire all ages of our civil servant technical workforce
- Build a solid budget and directorate level plan within an extremely tight fiscal environment
- Work legislation changes needed to allow Russian support for ISS



### Human Exploration & Operations Online

#### Beyond Earth: [www.nasa.gov/exploration](http://www.nasa.gov/exploration)

A topic page linked directly from the NASA.gov home page, this "Beyond Earth" section educates and informs the general public on the future of human spaceflight at NASA; it is the main point of entry to current news, features, images and video produced by HEO programs.

#### HEO Mission Directorate: [www.nasa.gov/directorates/heo](http://www.nasa.gov/directorates/heo)

The HEO directorate section is intended for informed audiences and gathers organizational information about divisions of the directorate as well as public documents, briefings and reports.

## Human Exploration & Operations

### 2012 Division Goals



#### International Space Station

- Utilize the ISS such that it shows the economic benefit of space-based research to commercial and private companies
- Effectively and creatively utilize the ISS for space-based research and technology demonstration across major NASA-funded research disciplines: U.S. National Laboratory commercial, non-profit, and other U.S. Government agency sectors; and International Partner research programs
- Ensure that the facility is supported in a manner that increases the research potential
- Communicate the findings and daily life on the ISS
- Maximize leveraging of the ISS for STEM educational outreach



#### Exploration Systems (SLS, MPCV, GSDO)

- Finalize/define contracts for SLS and MPCV
- Understand the requirements for the core to support multiple booster configurations
- Award the advanced booster development/demonstration contract
- Complete planned steps to prepare a sustainable launch site for SLS as well as commercial programs
- Establish a sound budget and technical requirements for the programs
- Deliver Orion MPCV flight test article core structure to KSC, initiate subsystem installation
- Complete SLS and GSDO system definition reviews.



#### Commercial Space Development

- Implement a commercial space program that ensures availability of, and access to, agency capabilities and assets in the pursuit of enabling commercial space flight endeavors
- Establish viable commercial cargo transportation for the ISS
- Develop strategy for and award next round of crew space acts
- Prepare for debut of cargo flight capability
- Develop plans to operate in a very constrained budget environment



#### Launch Services

- Safely fly the launches planned this year
- Establish a plan with the science mission directorate for launching several medium class missions in the future
- Investigate creative and effective ways to certify new launch vehicles



#### SSP Transition and Retirement

Safe, secure, and disposition Shuttle assets



#### Space Communication & Navigation

- Complete and launch TDRSS K
- Establish a creditable plan for upgrade of the TDRSS ground terminal at White Sands
- Effectively manage the DSN
- Accelerate the milestones to combine the ground network (GN), near-Earth network (NEN), and deep-space network (DSN) into an efficient, cost-effective, and internet-worked integrated network (IN) for the user community
- Push new technology—optical communication, DTN, uplink array technology, and advanced wireless technologies for spacecraft and suits



#### Space Life & Physical Sciences Research and Applications

- Continue and expand research opportunities within tight budget constraints
- Develop strategies to ensure research is focused toward current and future operational problems and lends itself to expanding human exploration beyond low-Earth orbit
- Look for creative ways to respond to the decadal survey
- Enable CASIS to be effective



#### Human Spaceflight Capabilities

- Implement creative ways to reduce facilities costs at MAF and WSTF by bringing in other users
- Facilitate the use of Agency-unique capabilities and assets in the pursuit of enabling commercial space development and utilization
- Consolidate rocket propulsion and test facilities
- Ensure the selection of a new astronaut class brings the talent needed for the future



#### Advanced Exploration Systems

- Evaluate and prioritize the portfolio needed to maintain focus on advancements that are tangibly relevant to the Agency's evolving long-term goals in human-robotic space exploration
- Leverage innovative new approaches to affordably develop needed capabilities for sustained human exploration.

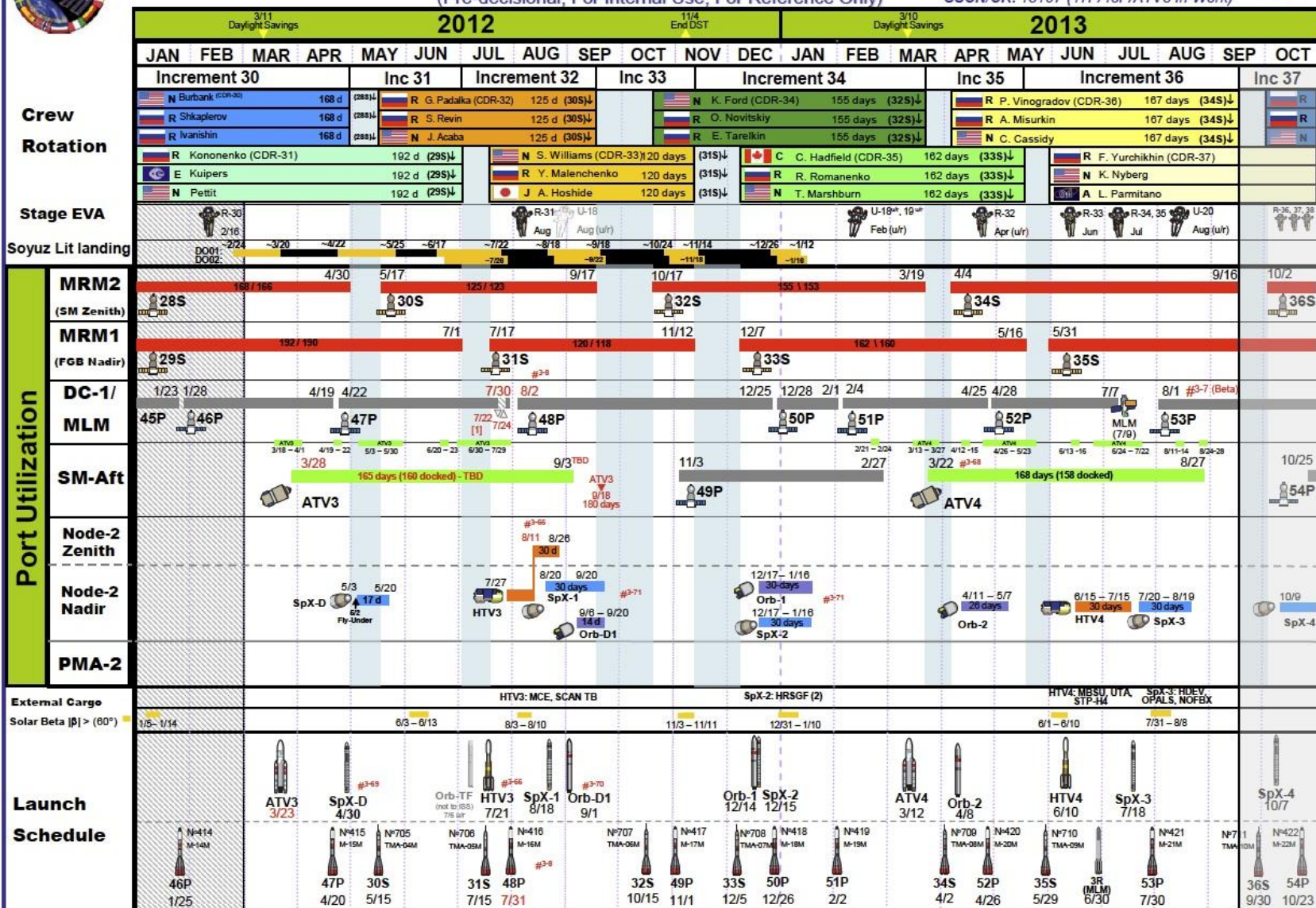
# International Space Station Tactical Flight Plan



For current baseline refer to  
SSP 54100 IDRD Flight Program

## ISS Flight Plan Flight Program Working Group (FPWG) (Pre-decisional, For Internal Use, For Reference Only)

NASA Official: John Coggeshall  
Prepared by: Scott Paul  
Chart Updated: Mar. 03<sup>rd</sup>, 2012  
SSCN/CR: 13107 (47P/48P/ATV3 In-Work)



## ***Over-pressurization during ground testing (30S)***

- **Soyuz 30S** - The Soyuz vehicle #704, slated for flight 30S (TMA-04M), had a problem during ground testing, prior to its shipment to Baikonur.
  - During pressure testing of the descent module and the pressurized section of the propulsion module, the vehicle was over pressurized and as a result it caused a leak in the area housing the hydrogen peroxide system for the thrusters that are used during descent and landing (*see next page*)
- **Status: A Russian Commission was formed to investigate the cause of the over-pressurization and ensure it doesn't happen again.**
  - Soyuz vehicle #704 was suspended from flight pending completion of further analysis
  - Soyuz vehicle #705, previously planned for flight 31S, is being accelerated for use on flight 30S
  - This results in a 6-week delay to the 30S launch
  - The crew of Soyuz 28S will remain on orbit another six weeks for a total of 168 days
  - Other Soyuz and Progress flights were replanned for the remainder of 2012

# Deformation and local failure SHELL CONTAINER ma lander spacecraft "TMA-04M» № 704



In the "Soyuz TMA-04M» № 704



Corrugations on the outside of the container PGA



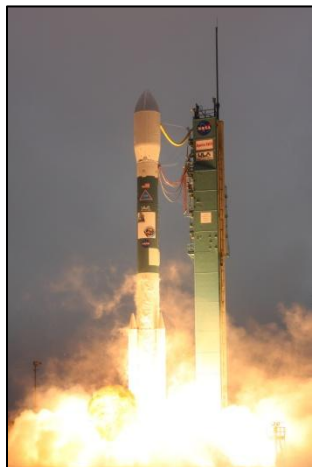
Cracks in the shell of the container on the PGA points to the power set of welding



# Launch Services Program – CY 2011 Highlights



**5 launches in 6 months!**



6/10/2011

8/5/2011

9/10/2011

10/28/2011

11/26/2011

- **Safely fly the launches planned this fiscal year (i.e., FY2012)**
  - 28 Oct 2011 – successful launch of National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) on Delta II from Vandenberg AFB
  - 26 Nov 2011 – successful launch of Mars Science Laboratory (MSL) on Atlas V 541 from Cape
  - In launch flow for Nuclear Spectroscopic Telescope ARray (NuSTAR) Pegasus XL mission
    - ILC 21 Mar 2012 from Kwajalein Atoll
  - Radiation Belt Storm Probes (RBSP) Atlas V 401 launch from Cape planned for NET Aug 2012
- **Establish a plan with the Science Mission Directorate (SMD) for launching several medium-class missions in the future**
  - Supporting SMD's effort to potentially dual manifest the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2) mission with the Air Force
  - Released multi-mission Request for Launch Service Proposals (RLSPs) on 3 Feb 2012 for 2 medium-class SMD missions (i.e., Soil Moisture Active-Passive (SMAP) & Orbiting Carbon Observatory-2 (OCO-2)) along with a National Oceanic & Atmospheric Administration (NOAA) mission (i.e., JPSS-1) -- Awards expected July 2012
  - Supporting SMD & NOAA by presenting commercial launch service options available to support JASON-3 mission
    - Also conducting proposal evaluations for 1 SMD small-class mission (i.e., Gravity and Extreme Magnetism Small Explorer (GEMS)) and 2 NOAA intermediate-class missions (i.e., Geostationary Operational Environmental Satellite (GOES) R & S)
- **Investigate creative and effective ways to certify new launch vehicles**
  - AF, NRO and NASA signed the New Entrant Certification Strategy in Oct 2011 that is based on the existing NASA policies for launch vehicle certification
  - LSP provides "Advisory Services" support to Commercial Resupply Services (CRS) & Commercial Crew Programs
  - LSP is continuing assessments for Falcon 9 block 1 and Antares using CRS contract data products

## **Safely fly the launches planned this fiscal year 2012 – Special Topic**

### **• Taurus XL T9 Mission “Glory” Launch Vehicle Failure Investigation Status**

- On 4 March 2011 the Glory mission failed to reach orbit.
  - Telemetry indicated that the Taurus XL fairing did not separate from the launch vehicle.
    - This was the second failure of the Taurus XL for a similar reason.
- On 16 Sep 2011 Orbital officially submitted its T9 Accident Investigation Board (AIB) report to NASA. The Orbital T9 AIB was unable to identify a root cause for the failure.
- On 16 Dec 2011 the NASA T9 Mishap Investigation Board (MIB) delivered its hard copy report to NASA HQ and subsequently provided an internal briefing to the NASA Flight Planning Board on 20 Jan 2012. The NASA T9 MIB was also unable to identify a root cause for the failure.
- On 2 Feb 2012 NASA terminated the Taurus XL launch service task order (LSTO) for the SMD OCO-2 mission.
- The NASA T9 MIB Report is going through the internal NASA review and endorsement process per NPR 8621.1B.
  - Once the review and endorsement is complete, the appropriate Corrective Action Plan (CAP) activities will begin.
  - We expect to make a summary report available to the public, like we did with the previous OCO failure, later this summer.

# Launch Services Program Manifest



FPB Approved 9/27/2011 Release 1/3/2012, Rev. 1	FY12				FY13				FY14				FY15				FY16				FY17				FY18		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
<b>Small Class (SC)</b>  Athena I  Falcon 1  Pegasus XL (P-XL)  Taurus XL (T-XL)																											
<b>Medium Class (MC)</b>  Athena II  Delta 732X (D3), 792X (D)  Falcon 9 (F9)																											
<b>Intermediate (IC) / Heavy Class (HC)</b>  Atlas V (AV)  Falcon 9 (F9)																											
<b>LSP ADVISORY ROLE</b>																											
<b>NASA COTS (Info only) (Managed by JSC)</b>																											
<b>Vehicle Unassigned</b>																											

△ = SCIENCE

◇ = DOD REIMBURSABLE

ER = EASTERN RANGE-

W = Wallops Launch

= MISSION

□ = HUMAN EXPLORATION AND OPERATIONS

CCAFS

WR = WESTERN RANGE-VAFB

UNSUCCESSFUL

C = CubeSat

K = KWAJALEIN

UR = UNDER REVIEW

For NASA Planning Purposes Only

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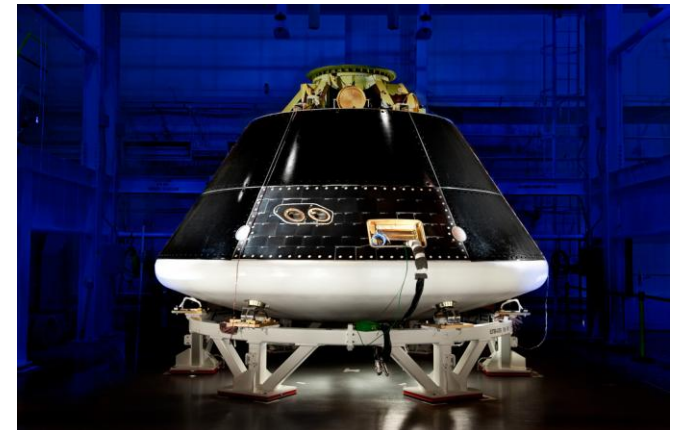
Rev-1:1/5/12

# Exploration Systems Division

## Orion Multi-Purpose Crew Vehicle (MPCV)



- EFT-1 Flight Test Undefinitized Contractual Action (UCA) issued Dec. 21, 2011; JOFOC Posted Jan. 5, 2012
- Initiated final CM barrel machining, completed cone and gore panel welding, delivered and assembled backbone
- Completed Drogue Chute Wind Tunnel Nov. 18, 2011
- Phase 1 Water Drop Testing Completed Jan. 6, 2012
- Conducted drop test of the Orion crew vehicle's entry, descent and landing parachutes on Feb. 29, 2012



# Exploration Systems Division

## Space Launch System (SLS)



- Detailed Synopses Posted on September 28:
  - Core Stage Engines
  - Stages Acquisition
- Detailed Synopses Posted on October 7:
  - Advanced Booster Engineering Demonstration and Risk Reduction
  - Advanced Development Request for Information
- SLS - Industry Day at Marshall Space Flight Center on September 29
- SLS - Industry Day at Michoud Assembly Facility on November 14
- Pratt & Whitney Rocketdyne Undefined Contractual Action (UCA) Released on November 29
- ATK UCA Released on December 16
- Boeing UCA Released on December 21
- SLS Advanced Development - Industry & Academia Day at Marshall Space Flight Center on February 14
- Upper Stage Engine (USE) development engine testing:
  - FY12 Q1 4 tests completed, FY12 Q1 ~ 955 seconds of USE hot-fire time, Cumulative 10 tests ~ 1040 seconds of hot-fire test time, Successfully demonstrated full flight USE mission duration



# Exploration Systems Division

## Ground Systems Development and Operations (GSDO)



- Mobile Launcher move to Pad B
- Vehicle Assembly Building (VAB) designs for cable removal and VAB door modifications complete
- Crawler Transporter-2 moved into VAB HB-2 to continue modification
- AB Door Project contract awarded to USA
- Pad B LH2/LO2 Cross Country Pedestal Refurbishment complete
- Tank Refurbishment sandblasting and painting started
- ML Structural Design Contract awarded to RS&H
- Received tilt-up umbilical arm test article at the the Launch Equipment Test Facility (LETF)
  - LETF Testing is scheduled to start beginning of May, 2012
- Initiated construction on CRF facility to support Orion Launch Abort System (LAS) assembly for EFT1
- Orion Ground Test Article (GTA) at KSC for GSE development



# Commercial Crew Development (CCDev2) – Funded Partners Status



## Blue Origin



- **Maturing their space vehicle design through System Requirements Review, their Pusher Escape System, and accelerate engine development for their Reusable Booster System**
- **Successfully completed 5 of 10 milestones and received \$11.2M out of \$22M**
  - Space vehicle mission concept review
  - Engine thrust chamber assembly interface & test plan review



- **Maturing their Crew Space Transportation design through Preliminary Design Review and performing development tests**
- **Successfully completed 8 of 15 milestones and received \$65M out of \$112.9M**
  - Delta systems definition review
  - Phase 0 safety review
  - Landing air bag drop demonstration



- **Maturing their Dream Chaser design through Preliminary Design Review and conduct hardware testing including an unpowered free flight test**
- **Successfully completed 7 of 15 milestones and received \$62.5M out of \$105.6M**
  - System requirements review
  - Flight Control Integration Laboratory
  - Engineering Test Article Structure Delivery



- **Maturing their Falcon 9/Dragon system focusing on developing a side-mounted Launch Abort System (LAS)**
- **Successfully completed 6 of 10 milestones and received \$55M out of \$75M**
  - LAS Propulsion Conceptual Design Review
  - Design Status Review #1 and #2
  - Crew Accommodation In-Situ Trial

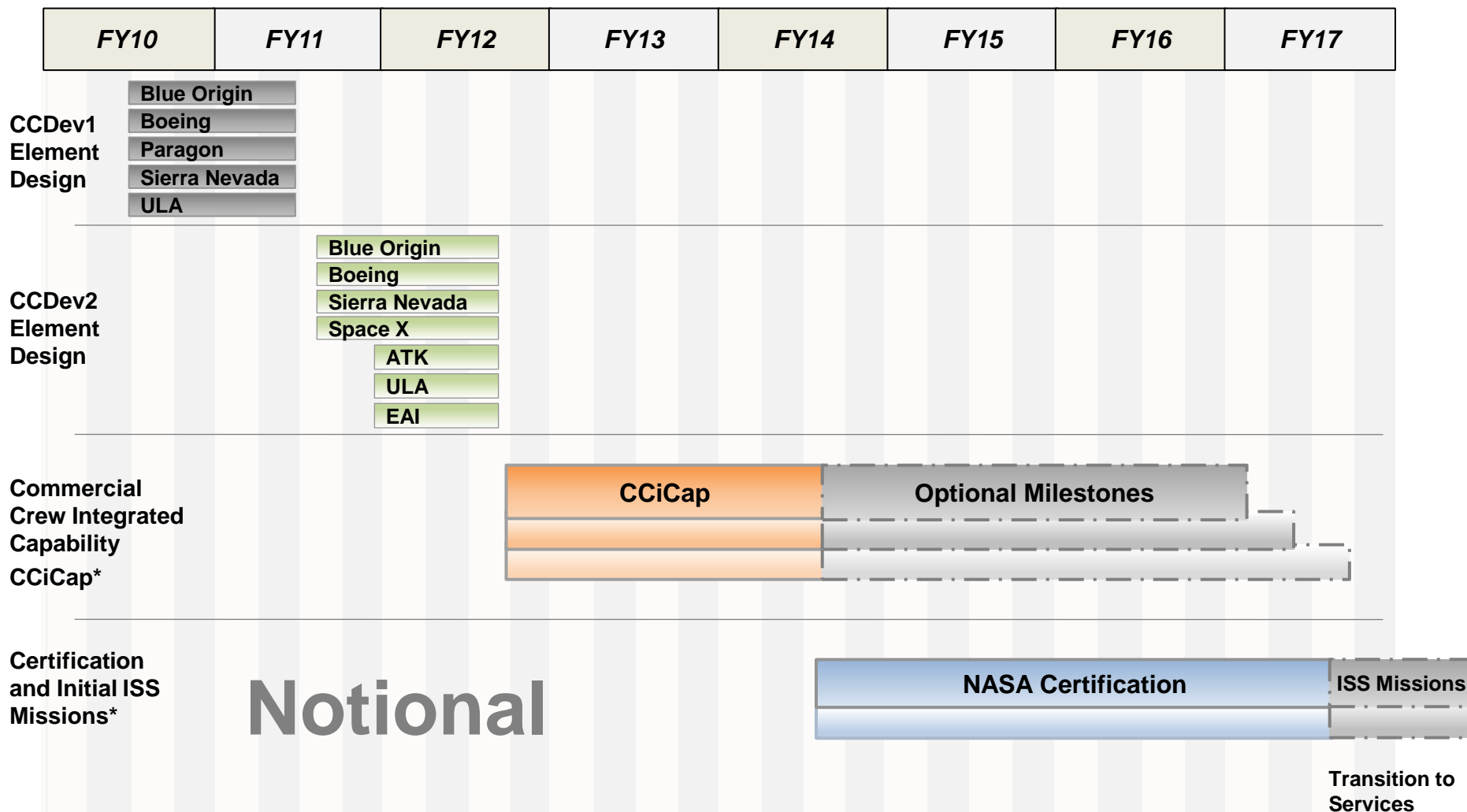
# Commercial Crew Development (CCDev2) – Unfunded Partners Status



- **Unfunded Space Act Agreement (SAAs) awarded to provide limited technical assistance for advancement of commercial crew space transportation concepts.**
  - United Launch Alliance awarded July 2011
    - 4 of 5 milestones completed
      - Launch vehicle design equivalency review and tailored SRR completed
  - Alliance Techsystems, Inc (ATK) awarded September 2011
    - 3 of 5 milestones completed
      - Launch system initial system design review completed
  - Excalibur Almaz, Inc (EAI) awarded October 2011
    - 2 of 5 milestones completed
      - System Requirements Status Review completed



# Commercial Crew Program Strategy



\*Number of awards to conform to budget

# Commercial Cargo Accomplishments



- Orbital has completed 23 of 29 milestones and received \$261.5M out of \$288M
- Orbital Antares maiden test flight is tentatively scheduled for the 2nd Quarter of 2012, and the Demonstration Mission to the ISS for the 3rd Quarter of 2012



Engine Integration



WFF Launch Site



Pressurized Cargo Module



- SpaceX has completed 36 of 40 milestones and received \$376M out of \$396M
- C2+ flight date tentatively scheduled for the end of April 2012



Launch Site at Cape Canaveral SLC  
40



COTS Demo Dragon Capsule @  
Cape Canaveral

# Space Life and Physical Sciences Research and Applications Status



- **The Ultrasound-2 was delivered to the ISS on the ULF-7 flight in July 2011**
  - The device has increased resolution from the previous system and has panoramic imaging capability.
- **The Spinal Elongation Study was delivered in June 2011**
  - Reliable estimate of spinal lengthening in microgravity was critical, given the Orion/MPCV seat configuration
  - Data will be used by seat designers, EVA suit designers to accommodate changes in body size during flight
- **The Center for Advancement of Science in Space selected in August 2011**
  - CASIS will expand research on the ISS by US companies
  - CASIS is completing a review of past space research to identify areas with high investment potential



Ultrasound 2 system on board ISS.  
First use with Mike Fossum as operator and Satoshi Furukawa as subject for cardiovascular research

# Advanced Exploration Systems

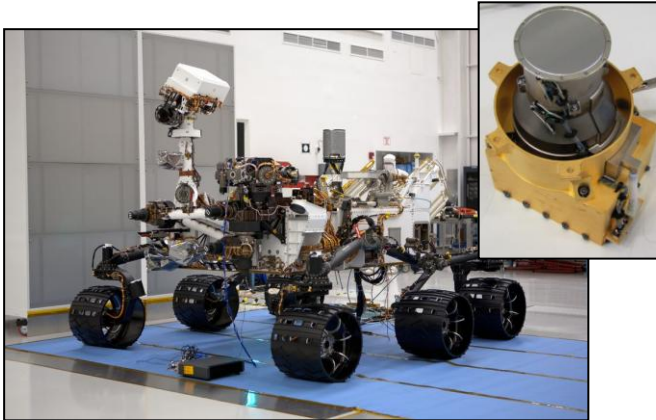
## Recent Accomplishments



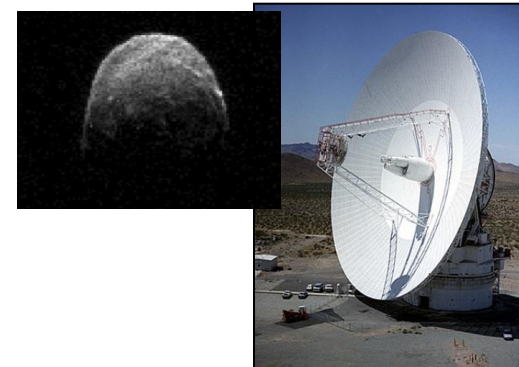
**Multi-Mission Space Exploration Vehicle (MMSEV) project evaluated human factors of crew cabin in tests on air-bearing floor.**



**Analog Missions project conducted NEEMO-15 underwater test to simulate asteroid mission operations and test anchoring techniques for EVA in low gravity.**



**Radiation Assessment Detector (RAD) was launched on Mars Science Laboratory mission on November 25. RAD will measure Mars surface radiation environment.**



**Goldstone Radar project has imaged five near-Earth asteroids to determine their size, shape, and spin rate.**

# Space Communications and Navigation (SCaN) Status



- **TDRS-K has completed Spacecraft Thermal Vacuum Testing and is on schedule to launch in December from KSC. We have exercised the TDRS-M option with Boeing Corporation, with a launch readiness date of December 2015.**
- **Space Network Ground Segment will conduct its system level PDR in July 2012.**
- **All 3 networks are exceeding command and tracking commitments to the NASA missions (availability greater than 99%).**
- **DSN Aperture Enhancement Project (34m BWG) will hold their System PDR in March. The DSS-35 pedestal foundation for the Canberra Deep Space Complex has been completed.**
- **The Architecture Assessment Review for the Integrated Network (IN) was completed in November 2011. Decisions were made in January 2012, and the IN plans are being updated to reflect these decisions, including early implementation of the Service Planning Portal and future budget realities.**

# **Space Communications and Navigation (SCaN) Status, continued**



- **The SCaN Testbed arrived in Japan for integration into HTV-3 for a Summer 2012 launch to the ISS, where it will serve as a demonstration testbed for space communications, available to government, industry and academia.**
- **SCaN is working in collaboration with the Office of the Chief Technologist to develop the Deep Space Atomic Clock (DSAC) and the Laser Communications Relay Demonstration (LCRD).**
- **SCaN continues to work on NASA's first laser communication demonstration, the Lunar Laser Communication Demonstration (LLCD), preparing for launch aboard the LADEE spacecraft in July of 2013 and demonstration of over 600 Mbps communication from the moon in September 2013.**

**Implement ways to reduce institutional cost by facilitating the use of Agency-unique assets in the pursuit of commercial space development and utilization as well as other non-space industries.**

## **Michoud Assembly Facility (MAF):**

- **Current:**

- Using Space Act Agreements, we have over 20 tenants worth over \$13M in deferred cost to our programs
- State, UNO, and LSU to re-structure NCAM management and operations

- **Prospects:**

- Demand Services Agreements in-work with Boeing (SLS) and Lockheed (MPCV)
- Lockheed FAST-2 Composite Tank testing
- Completed Agreement for Big Easy Productions for the filming of *Ender's Game* movie
- Working on arrangement with JSC, to off-load fabrication work to MAF from JSC Engineering
- Magnolia Fleeting looking at Harbor/Harbormaster building for lease
- Canadian Steel company (ADF Group) site visit on 12 January
- Expect Dynetics to look at MAF for a Booster Risk Reduction activity
- Inquiries received from teams for MSFC ESP Procurement
- Working several prospects in heavy manufacturing arena between NASA, LED and Jacobs.

# Rocket Propulsion Test



**Maintains NASA's wide variety of rocket propulsion test facilities for use by NASA, other agencies, and commercial partners.**

- **Provide critical testing facilities vital to NASA programs as well as DoD and commercial partners**
  - J2-X testing for the SLS upper stage (SSC)
  - AJ-26 engine testing for Orbital Antares launch vehicle (SSC)
  - RS-68 engine testing for Pratt & Whitney Rocketdyne and U.S. Air Force (SSC)
  - Missile Defense Agency testing at (WSTF)
  - Blue Origin engine testing (SSC)
  - Minuteman testing for U.S. Air Force (WSTF)
- **Maximize RPT resources for NASA, DoD, and commercial test programs**
  - Right-sizing study complete; implement through the FY 2014 budget process
  - Support, organize, and coordinate the National Rocket Propulsion Test Alliance to eliminate duplication of efforts and share infrastructure
  - Complete test stand 303, 405, and 406 transition to mothball state at White Sands Test Facility
- **Manage and monitor maintenance on critical infrastructure investments**
  - Stennis Space Center high pressure industrial water distribution system
  - SSC B Stand Liquid Hydrogen (LH2) dock
  - Refurbish critical LH2 and liquid nitrogen (LN2) systems at Glenn Research Center, Plum Brook Station
- **Engage commercial and international customers to provide high quality propulsion test services on reimbursable basis**
  - European Space Agency (ESA) testing of Ariane 5 mid-life extension upper stage at Plum Brook Station – B2
  - Solaren LOx/Rp testing at MSFC
  - Boeing hypergolic testing at WSTF

# Human Space Flight Operations



**Ensures that NASA's astronauts are fully prepared to safely carry out current and future missions**

- **Operate and conduct scientific research and experiments on board ISS; complete four crew rotations annually**
- **Maintain spaceflight readiness support and training for astronauts preparing for ISS**
- **Oversee aircraft operations at JSC, primarily composed of T-38 astronaut trainers**
- **Conducted NRC independent review of the HSFO planning for the post Shuttle era – very supportive recommendations**
- **Provide qualified astronauts and operations/development expertise for NASA human spaceflight endeavors, including Commercial Crew, Orion MPCV and SLS programs**
- **Select 2013 astronaut class (9 – 15 candidates from over 6,300 applications); training to begin in June 2013; eligible for flight assignment in early 2015**
- **Merge space medicine occupational health and bioastronautics consolidated contracts to align space medicine with occupational medicine through an occupational health surveillance approach**
- **Complete visual impairment/intracranial pressure studies to aid development of mitigation strategies for possible microgravity effects on vision**

# Strategic Analysis and Integration

## HSF Architecture and International Collaboration



- **Architecture and Analysis**

- Developed top level ESD program requirements (SM, CPS, engine config) to achieve mission capture and sensitivity analysis
- Identified common capabilities needed for exploration of multiple destinations, including E-M L2 and cis-lunar DRMs
- Integrating SLS and MPCV development test flights and payloads in 2014, 2017 and 2021 with exploration advanced tests and experiments

- **Interagency and International**

- ISS utilization & applications (MCB action/ISTAR)
- Global Exploration Roadmap (GER), released September 2011, positive for NASA and its partners
- Second GER iteration planned for end 2012/early 2013; focus areas:
  - Early design reference missions in both Asteroid Next and Moon Next scenarios, maximizing use of ISS in support of exploration
  - Sharing agency priorities for advanced technology investment areas
  - Enabling additional synergies with robotic science exploration missions by defining human space exploration knowledge gaps for each destination
  - ISECG benefits whitepaper
- Technology and capability development includes opportunities for international contributions

# Mission Support Services Offices (MSSO) Education and Public Engagement



- **Orion Test Article Tour**
  - Hardware move from New Mexico to Florida was leveraged to create public awareness campaign
- **4 Recent HEO Videos released**  
<http://www.nasa.gov/exploration/multimedia/index.html>
- **Future of Human Spaceflight Interactive**
  - Web feature connecting the dots of Human Spaceflight  
[http://www.nasa.gov/externalflash/human\\_space/](http://www.nasa.gov/externalflash/human_space/)
- **Content Mapping Interactive**
  - Provides a multimedia collection of content that aims to provide rationale for continued human space exploration.  
<http://www.nasa.gov/exploration/whyweexplore/cmap.html>
- **Mission X: Train Like an Astronaut**
  - International campaign (2012-2014) to leverage the inspirational power of astronauts to fight childhood obesity

